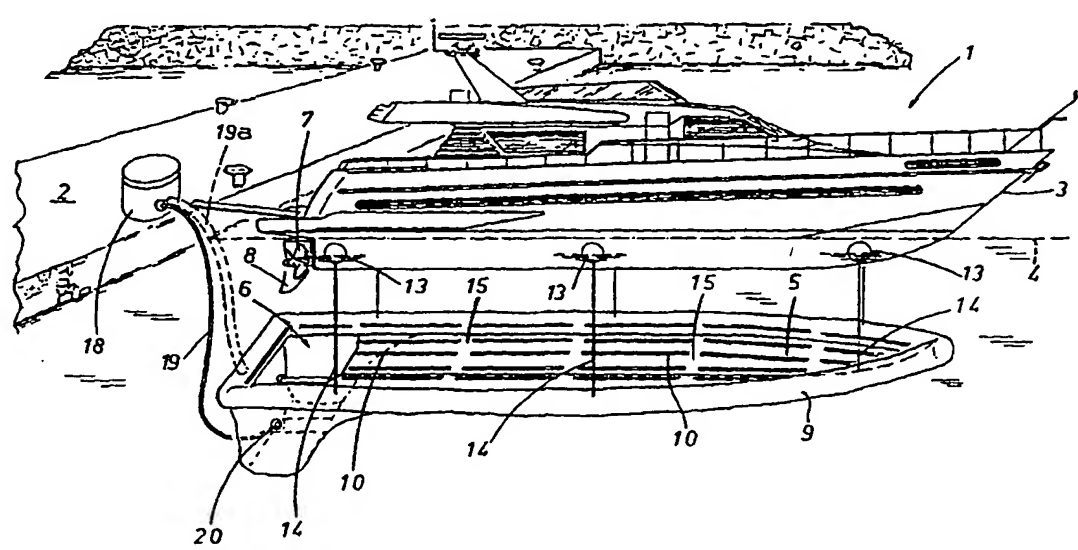




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>B63B 59/04</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 98/28184</b> <b>(43) International Publication Date:</b> 2 July 1998 (02.07.98)
<b>(21) International Application Number:</b> PCT/IB97/01577 <b>(22) International Filing Date:</b> 17 December 1997 (17.12.97)  <b>(30) Priority Data:</b> BO96A000681      20 December 1996 (20.12.96)      IT  <b>(71) Applicant (for all designated States except US):</b> NEW AGE CONSTRUCTIONS AND ENGINEERING S.P.A. [IT/IT]; Via Marziale, 25, I-40128 Bologna (IT).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BORGHI, Enzo [IT/IT]; Via L. Romagnoli, 15, I-40054 Budrio (IT).  <b>(74) Agent:</b> LANZONI, Luciano; Bugnion S.p.A., Via dei Mille, 19, I-40121 Bologna (IT).		<b>(81) Designated States:</b> AU, IL, NZ, SI, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>With amended claims.</i>
<b>(54) Title:</b> A DEVICE AND METHOD FOR PROTECTING BOAT HULLS, ESPECIALLY AGAINST BIOLOGICALLY ACTIVE ORGANISMS   <b>(57) Abstract</b> <p>The device for protecting a hull (3) of a boat (1) against water-borne organisms, without lifting it out of the water, comprises sheathing (5, 6) covering at least the submerged part of the hull (3) and designed to isolate the hull itself; the sheathing (5) is associated to corresponding means (9, 16, 17) to position it in relation to the hull (3); the method envisages the raising of the said sheathing (5) from a sunken position to enable it to be fitted to the hull (3).</p>		

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Description

A device and method for protecting boat hulls,  
especially against biologically active organisms

Technical Field

The present invention relates to a device and a method for protecting boat hulls, especially against biologically active organisms.

5

Background Art

It is well known that boat hulls which remain in contact with sea, lake or river water for long periods become encrusted with algae, mollusks and other organic matter.

10

These encrustations are particularly undesirable in pleasure craft since they appreciably alter the hydrodynamic characteristics of the craft and hence worsen its overall performance, not to mention the permanent damage they cause to the bottom of the hull.

15

To prevent these encrustations from forming (or to remove them after they have formed), the boat must be periodically sent to a boatyard, dry-docked and, if necessary, stripped, so that a suitable protective paint can be applied to it.

20

These operations are highly labour-intensive and require skilled labour and expensive machinery, besides having harmful effects on the environment since the protective paints normally used contain toxic and corrosive pollutants.

25

Disclosure of the Invention

The aim of the present invention is to overcome the above mentioned disadvantages.

30

This aim is achieved by providing the boat hull with an effective protection against encrustations due in particular to water-borne biological organisms without using paints.

5 The first aspect of the invention envisages an element to protect the hull characterized in that it comprises sheathing designed to cover at least the submerged part of the hull and associated with means to position the sheathing relative to the hull.

10 The second aspect of the invention envisages a method to protect the boat hull against water-borne organisms by preventing such organisms from growing on the hull characterized in that the preventive action is achieved by covering at least the submerged part of the hull with sheathing designed to isolate the hull from the surrounding water.

The invention will now be described with reference to the accompanying drawings in which:

15 - Figure 1 is a side elevation view of a boat moored to a quay, with the sheathing to protect the submerged part of the hull shown in a perspective view in the sunken position under the hull;

- Figure 2 is a partial schematic cross section through the centre of the boat shown in Fig. 1 so as to better illustrate the bottom part of the hull and the sheathing underneath it;

20 - Figure 3 is a view similar to that of Fig.1 but showing the sheathing fitted over the submerged part of the hull;

- Figure 4 is a cross section similar to that of Fig. 2 but with the sheathing fitted over the submerged part of the hull;

25 - Figure 5 is a partial schematic cross section, through the stern, of the boat illustrated in Fig.3.

- Figure 6 is a perspective view of a boat with the protective sheathing showing the latter while it is being fitted to the hull when the boat is not moored to a quay but is, for example, riding at anchor in the roads.

30 With reference to Figs. 1 to 5, which illustrate a first preferred embodiment of the invention, the numeral 1 indicates a boat moored to a quay 2 in a harbour, the bottom of the hull 3, that is to say, the part below the waterline 4, being submerged in water.

35 The protection device disclosed by the present invention comprises a sheath consisting of a shell 5 made of metal, plastic or rubber, either rigid or flexible, essentially concave in shape

and designed to fit at least over the submerged part of the hull 3 so as to isolate it from the surrounding water. The back part of the shell 5, designed to fit over the hull 3 astern, is equipped with recesses 6 designed to accommodate the propellers 7 and the rudder 8.

The shell 5 is peripherally connected to positioning means comprising an inflatable element 9, preferably tubular, and long enough to run right round the hull 3 at the waterline and, once inflated, designed to keep the shell 5 against the hull 3.

The shell 5 and the inflatable element 9 are preferably equipped with spacers 10 made of metal, plastic or rubber running lengthways along the hull to keep the hull 3 at a preset distance from the shell 5 and from the inflatable element 9 in such a way as to create a gap 11 for the controlled forced circulation of a liquid used to wash the hull and the other submerged parts of the boat and containing anti-biological substances designed to inhibit the growth of water-borne organisms. This is especially convenient when the boat is used at sea since the washing liquid may consist of fresh water used to rinse harmful brine off the hull, the propellers 7, the outboard parts of the motors and the rudders.

The forced circulation of the washing liquid is carried out by a service unit 18 located on the quay 2, including a pump connected to the tank that contains the washing liquid and equipped also with a pipe 19 leading into a manifold that is connected to the shell 5.

The service unit 18 may also include a compressor used to inflate the element 9 through an appropriate pipe 9a shown with a dashed line in Fig. 1.

The bottom of the shell 5 is equipped with ballasting means, consisting, for example, of a container 12 filled with water or other ballasting substance to keep the shell 5 under the water in the mooring area when the boat 1 is not moored to the quay 2.

Buoys 13 are also envisaged, each being connected to the inflatable element 9 by a cable 14 and designed to mark the position of the shell 5 when sunken and to determine the sinking depth.

The spacers 10 have appropriate break in them in such a way as to form a system of transverse channels 15 on the surfaces of the shell 5 and of the inflatable element 9 facing the hull 3 so as to make it easier for water to drain off when the shell 5 is raised towards the surface of the water.

Fig. 6 illustrates a second preferred embodiment of the present invention particularly suitable for protecting the hull of a boat that is riding at anchor in the roads.

In this second embodiment, the inflatable element 9 is divided into a front portion 16 and a rear portion 17 which can be inflated separately: this facilitates the positioning of the shell 5 on the hull 3.

The protective device illustrated in Figs. 1 to 5 is used as follows. When the boat 1 comes into the harbour to be berthed near the quay 2, it is steered between the buoys 13 which mark the position of the shell 5, the latter being kept at a certain depth below the surface of the water. The inflatable element 9 of the shell 5 is then inflated and, if necessary, the water or other ballast emptied out of the container 12, so that the shell emerges from under the boat and the spacers 10 come into contact with the submerged part of the hull 3. Initially, the correct position of the shell 5 relative to the boat 1 is guaranteed by the buoys 13 which constitute a set of reference points to enable the boat 1 to be moored in the correct position over the shell 5. Then, when the inflatable element 9 starts emerging, it tends to move naturally into position round the hull without requiring complicated manoeuvring of the boat since the perimeter of the inflatable element is substantially the same in shape as the cross section of the hull at the waterline.

To use the protective device illustrated in Fig. 6, it is necessary first of all to lower it into the water from the boat 1, with the inflatable element 9 deflated so that it will sink. The front portion 16 of the inflatable element 9 must be inflated using the service unit installed on board (not illustrated) and, once the front portion 16 has emerged, the boat 1 can be steered forward into it in such way that the bow of the hull 3 comes into contact with the front portion 16. This manoeuvre is facilitated

by the "V" shape of the front portion 16 which is designed to accommodate the bow of the hull. In this way, the shell 5, still partially sunk is correctly aligned with the hull 3. It is then possible to inflate the rear portion 17 of the inflatable element 9 so as to bring the back part of the shell 5 and the related recesses 6 into contact with the back part of the hull 3.

In both the cases described above, the positioning of the shell 5 against the hull 3 of the boat 1 is quick and easy. The hull 3 of the boat 1 is protected easily and effectively against encrustations due to algae, mollusks and other organisms since the shell 5 isolates the submerged part of the hull 3 from the surrounding water during the periods when the boat is not used which are usually those when the encrustations develop.

To make the shell 5 stable under water, it can be equipped with safety stays anchored to the sea bed (not illustrated).

The service unit 18 may be equipped with a remote control to start inflating the inflatable element 9 while the boat is approaching its berth.

Moreover, to facilitate the emergence of the shell 5 once the element 9 has been inflated, a number of single-acting valves, collectively labelled 5v in Fig. 4, may be fitted to various parts of the shell in order to allow the water to flow out of the hollow parts of the shell.

The invention described can be subject to modifications and variations without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

- 1) A device for protecting boat hulls, especially against biologically active organisms, characterized in that it comprises sheathing (5, 6) covering at least the submerged part of the hull (3) and designed to isolate the hull (3) from the surrounding water.
- 2) The device according to claim 1 characterized in that the said sheathing (5) is connected to means (9, 16, 17) for positioning it in relation to the hull (3).
- 3) The device according to claim 1 characterized in that the said sheathing (5) is concave in shape, at least when used and is designed to fit over the said submerged part.
- 4) The device according to any of the foregoing claims characterized in that the said sheathing (5) has recesses (6) made in it to accommodate propellers (7) and rudder (8) of the hull (3).
- 5) The device according to any of the foregoing claims characterized in that the said sheathing (5) is equipped with a ballast (12).
- 6) The device according to any of the foregoing claims characterized in that the said sheathing (5) is connected to a plurality of buoys (13) by means of cables (14).
- 7) The device according to any of the foregoing claims characterized in that the said sheathing (5) is equipped with single-acting valves (5v) to facilitate the outflow of the water.
- 8) The device according to any of the foregoing claims characterized in that the said positioning means comprise an inflatable element (9) whose perimeter is substantially the same in shape as the cross section of the hull (3) at the waterline.



9) The device according to claim 8 characterized in that the said inflatable element (9) is tubular in shape.

10) The device according to claim 8 or 9 characterized in that the said inflatable element (9) is divided into two parts (16, 17) which can be inflated independently of each other.

11) The device according to claim 10 characterized in that one of the parts (16) of the said parts (16, 17) is V-shaped so as to accommodate the bow of the hull (3).

12) The device according to any of the foregoing claims characterized in that spacers (10) can be placed between the hull (3) and the said sheathing (5) and/or the said positioning means (9, 16, 17).

13) The device according to claim 12 characterized in that the said spacers (10) extend lengthways in relation to the hull (3).

14) The device according to claim 13 characterized in that the said spacers (10) have appropriate lengthways breaks (15) in them.

15) The device according to claim 14 characterized in that the said breaks (15) are transversely aligned in such a way as to form a system of channels.

16) The device according to any of the foregoing claims characterized in that the said sheathing (5) and/or the said inflatable elements (9, 16, 17) can be connected to a service unit (18) which can be operated from a distance.

17) A method for protecting the hull (3) of a boat (1) in the roads or moored to a quay by inhibiting the growth of biologically active organisms on the submerged part of the hull (3) characterized in that the inhibiting action is achieved by fitting

sheathing (5, 6) to at least the submerged part of the hull (3) in order to isolate the hull (3) from the surrounding water.

18) The method according to claim 17 characterized in that before the said sheathing (5) is fitted, it must emerge from the sunken position under the boat (1).

19) The method according to claim 18 characterized in that the emergence of the said sheathing (5) is achieved by inflating separate parts of positioning means (9, 16, 17).

20) The method according to claim 19 characterized in that the front parts (16) of the said positioning means are inflated before the back parts (17).

21) The method according to claims 17 to 20 characterized in that a washing fluid is made to circulate between the said sheathing (5) and the said hull.

## AMENDED CLAIMS

[received by the International Bureau on 15 May 1998 (15.05.98);  
original claims 1-21 replaced by amended claims 1-14 (4 pages)]

1) A device for protecting boat hulls, especially  
against biologically active organisms, comprising a  
sheathing (5, 6) covering at least the submerged part of  
the hull (3) and designed to isolate the hull (3) from  
5 the surrounding water, the sheathing (5, 6) being  
connected to inflatable elements (9, 16, 17) whose  
perimeter is substantially the same in shape as the cross  
section of the hull (3) at the waterline for positioning  
it in relation to the hull (3), characterized in that  
10 spacers (10) are placed between the hull (3) and the  
sheathing (5, 6) and/or the inflatable element (9), the  
spacers (10) extending lengthways in relation to the hull  
(3), having appropriate lengthways breaks (15) in them  
and being transversely aligned in such a way as to form  
15 a system of channels.

2), A device for protecting boat hulls, especially  
against biologically active organisms, comprising a  
sheathing (5, 6) covering at least the submerged part of  
the hull (3) and designed to isolate the hull (3) from  
20 the surrounding water, the sheathing (5, 6) being  
connected to inflatable elements (9, 16, 17) whose  
perimeter is substantially the same in shape as the cross  
section of the hull (3) at the waterline for positioning  
it in relation to the hull (3), said inflatable element  
25 (9) being divided into parts (16, 17), characterized in  
that the parts are front parts (16) and a rear parts (17)  
inflatable independently of each others, whereby the  
positioning of the sheathing (5, 6) on the hull (3) is  
facilitated.

30 3) The device according to claim 2, wherein the front

AMENDED SHEET (ARTICLE 19)

parts (16) are V-shaped so as to accommodate the bow of the hull (3).

4) The device according to anyone of the foregoing claims, wherein the sheathing (5, 6) is equipped with a ballast (12) comprising a container fillable with water or other ballasting substance.

5) The device according to anyone of the foregoing claims, wherein the sheathing (5, 6) is connected to a plurality of buoys (13) by means of cables (14).

6) The device according to anyone of the foregoing claims, wherein the sheathing (5, 6) is equipped with single-acting valves (5v) to facilitate the outflow of the water.

7) The device according to anyone of the foregoing claims, wherein the sheathing (5, 6) is equipped with safety stays anchored to the sea bed, whereby the sheathing (5, 6) is stable under water.

8) The device according to anyone of the foregoing claims, wherein the sheathing (5, 6) and/or the inflatable elements (9, 16, 17) can be connected to a service unit (18) which can be operated from a distance.

9) A method for protecting the hull (3) of a boat (1) in the roads or moored to a quay, by means of a sheathing (5, 6) provided with inflatable elements (9, 16, 17), inhibiting the growth of biologically active organisms on the submerged part of the hull (3), the method comprising the steps:

emerging the sheathing (5, 6) from a sunken position under the hull (3);

fitting the sheathing (5, 6) connected to inflatable elements (9, 16, 17), to at least the submerged part of

AMENDED SHEET (ARTICLE 19)

the hull (3) in order to isolate the hull (3) from the surrounding water;

inflating the inflatable elements (9, 16, 17) for positioning the sheathing (5, 6) in respect to the hull (3);

5 characterised in that it comprises:

keeping the sheathing (5, 6) at a preset distance from the hull (3) by means of spacers (10), whereby creating a gap (11) between the hull (3) and the sheathing (5, 6), the spacers (10) extending lengthways  
10 in relation to the hull (3), having appropriate lengthways breaks (15) in them and being transversely aligned in such a way as to form a system of channels, whereby draining off the water is facilitated when the sheathing (5, 6) is emerging.

15 10) The method according to claim 9, wherein it comprises flowing out the water in the sheathing (5, 6) by means of single-acting valves (5v).

11) The method according to claims 9 or 10, wherein the emerging step of the sheathing (5, 6) is achieved by  
20 inflating separate parts of the inflatable elements (9, 16, 17).

12) The method according to claim 10, wherein the front parts (16) of the inflatable elements are inflated before the rear parts (17), whereby the positioning of the  
25 sheathing (5, 6) on the hull (3) is facilitated.

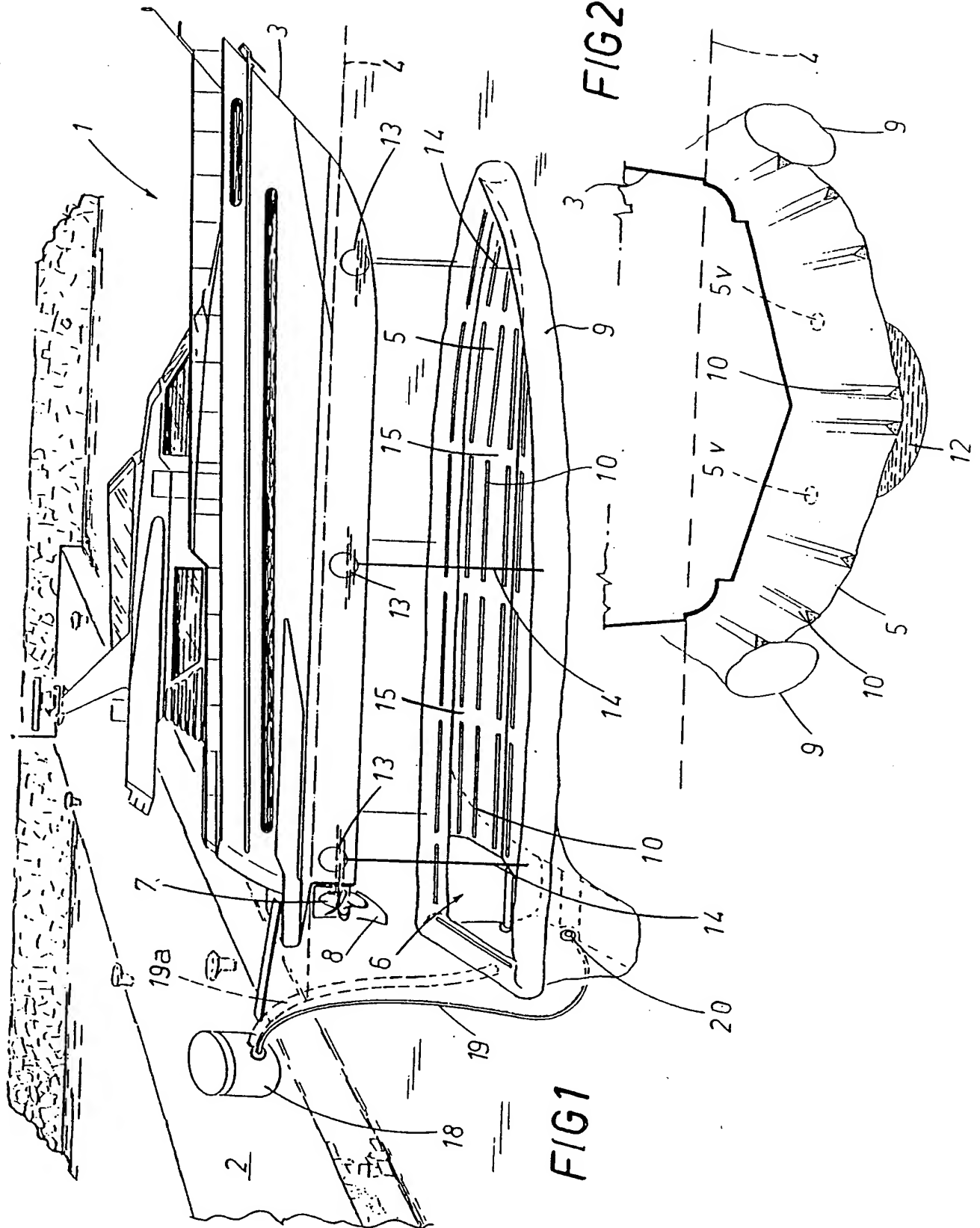
13) The method according to anyone of claims 9 to 12, wherein it comprises a washing step made by a washing fluid circulating between the sheathing (5, 6) and the hull (3).

30 14) The method according to anyone of claims 9 to 13,

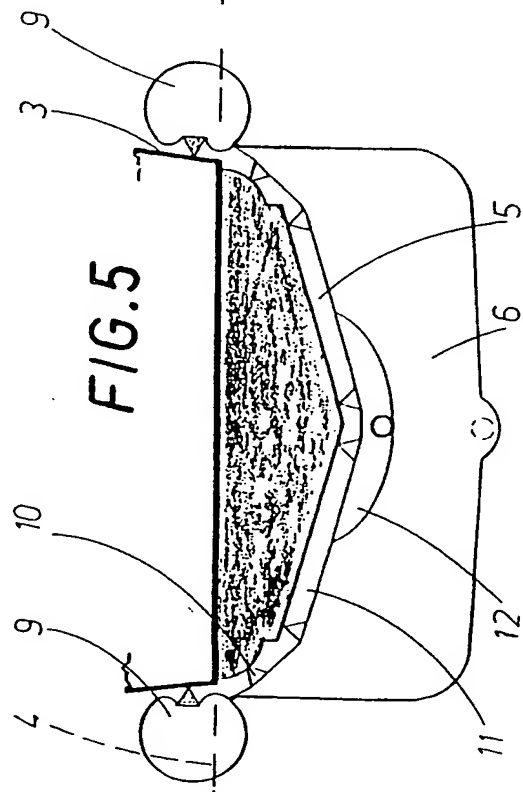
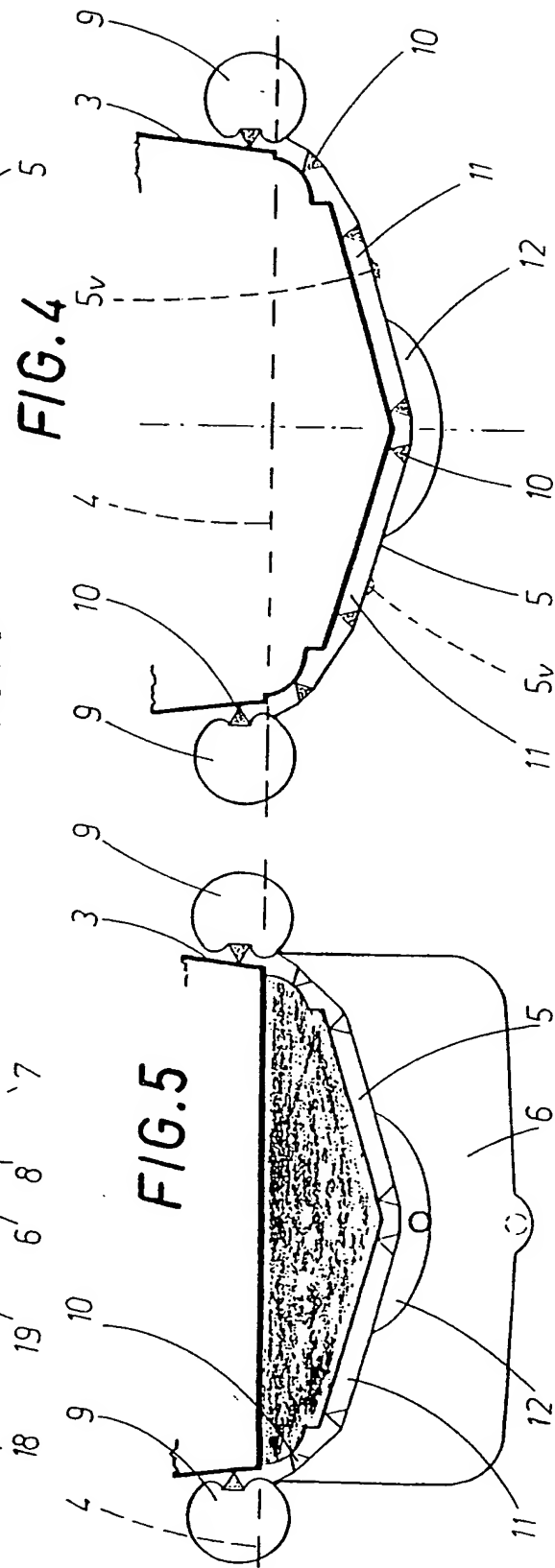
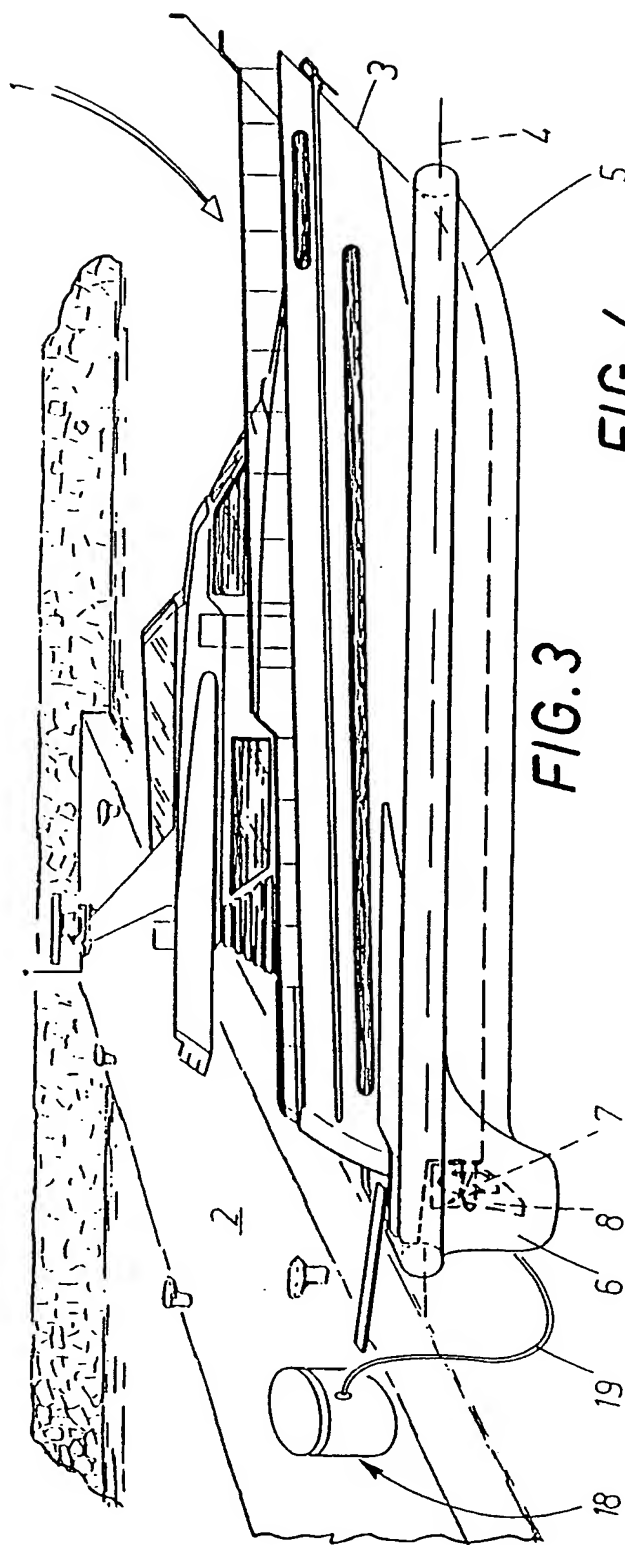
wherein the inflating step and the washing step are carried out by a service unit (18) which can be operated from a distance and can be located on a quay (2) or on board.

AMENDED SHEET (ARTICLE 19)

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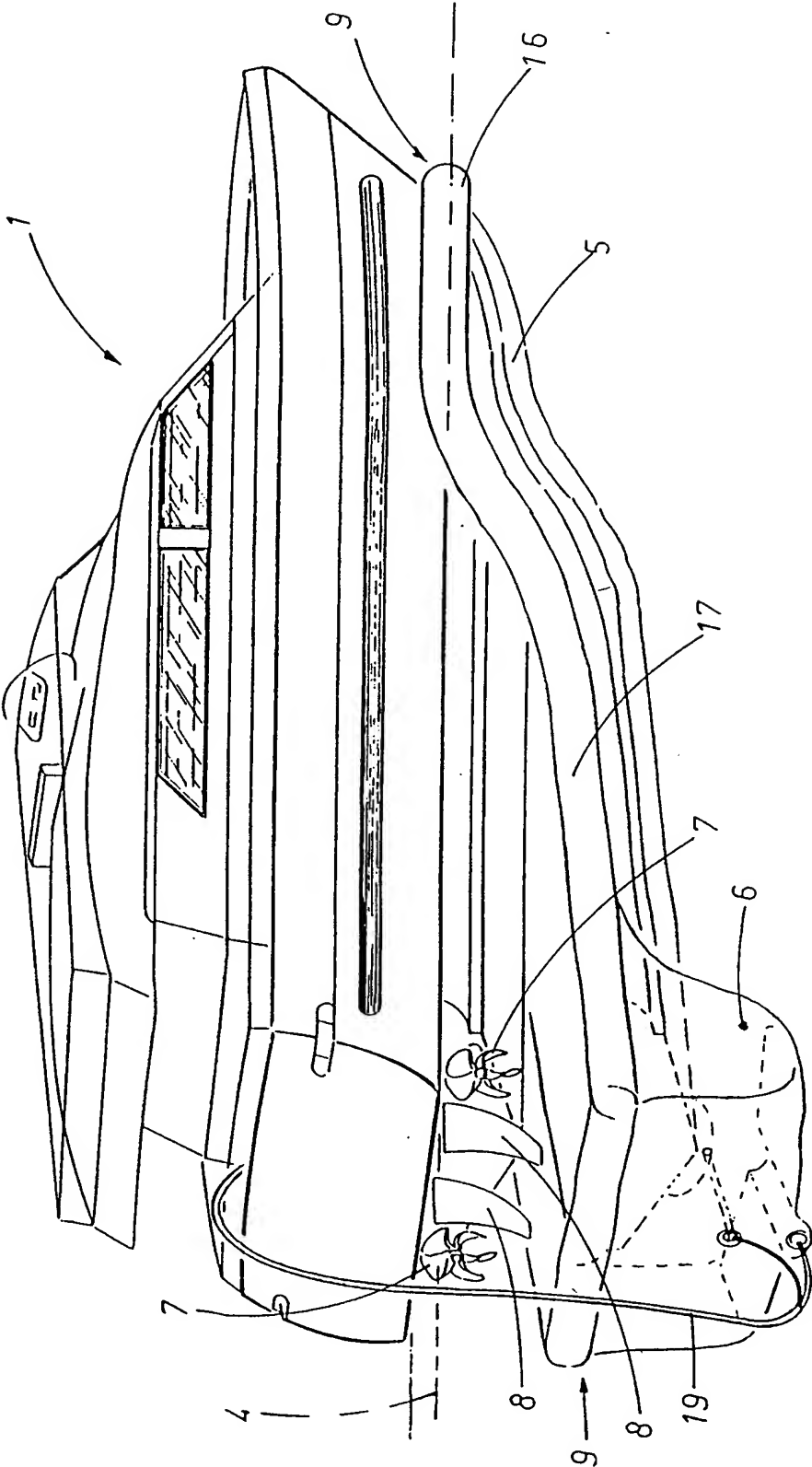
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FIG 6



# INTERNATIONAL SEARCH REPORT

Inte. l. onal Application No

PCT/IB 97/01577

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B63B59/04

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 24 28 945 B (LEIPERSBERGER) 21 August 1975	1-4, 7-11, 16, 17, 19, 21 20
Y	see the whole document ---	
X	AU 64116 65 A (TONKIN) 14 March 1968	1-3, 6, 12, 13, 17, 21 14, 15
A	see page 7, paragraph 4 - paragraph 5; figures 1-3 ---	
X	US 5 152 242 A (BRADLEY) 6 October 1992  see column 3, line 59 - line 64; figures 1-4 ---	1-3, 5, 8, 9, 12, 16-19
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

6 March 1998

Date of mailing of the international search report

17/03/1998

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# INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 38 06 265 A (KUNICKI) 7 September 1989 see the whole document -----	1 20

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. .onal Application No

PCT/IB 97/01577

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